RESEARCH INTO FILM

An empirical approach to film studies

Statistical literacy in film studies I

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Posted by **Nick Redfern**

A theme we will return to over the course of this year's posts is statistical literacy in film studies.

In the recent film policy review published by the DCMS (here (http://www.culture.gov.uk/publications /8743.aspx)) it was noted that there exists an artificial division between the humanities and the sciences in education in the UK and that this unhealthy for the film industry in particular.

> *It was noted that some curricula already allow a wider range of subjects easily to be combined but that in general students were driven to either arts and humanities, or science courses. This was not in step with the kinds of skills and talents being sought by cutting edge, creative film companies or in the competitive arena of post-production and special effects.*

> *The Panel recognises that it is vital to the success of the creative industries in the UK that pupils in secondary schools are made aware of the importance of studying arts and science in tandem rather than being pushed to choose between them. The Panel believes it is the synergy between these subjects that is crucial to the development of expertise in many of the creative sectors and especially in film. The Panel would like to see DfE building on proposals in Next Gen, the Review by Ian Livingstone and Alex Hope undertaken for the National Endowment for Science, Technology and the Arts (NESTA) at the request of the Minister for Culture, Communications and Creative Industries.*

The NESTA report can be accessed here (http://www.nesta.org.uk/publications/assets/features /next_gen).

The concerns of the film policy review are focussed on the need to develop a skilled workforce that can continue to make the UK a hub for production and visual effects in the global film industry, but the negative aspects of this separation can be extended to intellectual inquiry in general.

The separation between film studies and statistics can also be viewed as antithetical to the needs of the film industry. The cinema is an industry and as such requires individuals who not only understand how that industry works (which has traditionally fallen within the scope of film studies) but also understand statistics as used in economics, management, and marketing in that industry (which is most definitely not encompassed by the film studies curriculum). Arts and sciences should be taught together, and one way to achieve this in film studies is by developing statistical literacy in film scholars.

Statistics in film studies

The study of film is a diverse field comprising four distinct but related fields of inquiry: film industries, technologies, and film policy; textual analysis; ethnographic research on audiences; and the cognitive-psychological processes of perception and cognition (see here (http://nickredfern.wordpress.com /2011/11/03/research-and-policy-making-symposium/) for more detail).

Statistics is relevant to each of these four areas and film students will encounter information presented in the numerical, graphical, and tabular form in whatever aspect of the cinema they choose to study. Statistical summaries feature in many film studies texts, in newspaper and magazine articles on the cinema, and in official reports and statistical yearbooks. Indeed, the DCMS report itself uses many different statistical methods (including some really horrible doughnut graphs). Film scholars will also encounter more advanced methods in research from disciplines such as neuroscience or economics where scientific and/or statistical knowledge is commonplace.

To illustrate the use of statistics the following provides an example from each of the four areas identified above.

Film industries

Simonton DK 2005 Cinematic creativity and production budgets: does money make the movie? (http://escholarship.org/uc/item/9rv1c5q7), *The Journal of Creative Behavior* 39(1): 1-15.

This paper examines the relationship between production budgets and box office success, awards, and critical acclaim, and uses statistical terms and methods including correlation, sample, variables, mean, standard deviation, range, Cronbach's alpha coefficient, p-values, hypothesis tests, and tables.

Textual analysis

Wang C-W, Cheng W-H, Chen J-C, Yang S-S, and Wu J-L 2007 Film narrative exploration through the analysis of aesthetic elements (http://ntur.lib.ntu.edu.tw/bitstream/246246/155332/1/98.pdf), in T-J Cham, J Cai, C Dorai, D Rajan, and T-S Chua (Eds.) *Proceedings of the 13th International Conference on Multimedia Modeling – Volume I* . Berlin: Springer-Verlag: 606-615.

This paper uses statistical models to reveal the structure of narratives in films by analysing aesthetic features, and uses line charts, tables, flow charts, weighting functions, shape parameters, percentages, and sigma notation.

Audience research

Hardie A 2008 Rollercoasters and reality: a study of big screen documentary audiences 2002-2007 (http://www.participations.org/Volume%205/Issue%201%20-%20special/5_01_hardy.htm), *Participations* 5 (1).

This paper presents the results of a questionnaire survey of audiences for documentary feature films, and uses a range of statistical methods, including percentages, bar charts, stacked pie charts, (horrible) pie charts, and tables.

Perception in the cinema

Mital PK, Smith TJ, Hill R, and Henderson JM 2011 Clustering of gaze during dynamic scene viewing is predicted by motion (http://www.bbk.ac.uk/psychology/our-staff/academic/tim-smith/documents /Clustering_of_Gaze_During_Dynamic_Scene_Viewing_is_Predicted.pdf), *Cognitive Computation* 3 (1): 5-24.

This paper studies attention in viewing scenes in motion picture and uses a range of statistical methods and terms (alongside other scientific terms), including range, mean, non-linear statistics, Receiver Operating Characteristic curves, *k*-means clustering, histograms, line charts, tables, covariance, Gaussian mixture models, time series charts, standard error, and Bayesian Information Criteria.

Clearly understanding research on the cinema requires a relatively high level of statistical literacy, and yet I am not aware of any film studies programme that incorporates statistics as part of its tuition. Many reading the above papers will they have a grasp on what they were intended to achieve and the main results, but this is not the same as understanding why the methods used were chosen or being able to evaluate the design of a study. It is a serious failing in the instruction students receive on film studies degrees that they are expected to deal with numerical and graphical data on a regular basis without the proper training in statistical concepts and methods. For £9000 p.a. – or however much you are paying for your education – I would expect to get more than merely the gist of a piece of research.

Statistical literacy, mathematics, and the liberal arts

> *Statistical literacy is to statistics as art appreciation is to art (http://www.statlit.org /pdf/2006SchieldPosterICOTS.pdf)*
>
> *Milo Schield and Cynthia Schuman Schield*

The concept of 'literacy' has come to mean the 'idea of being able to find one's way around some kind of system, and to "know its language" well enough to make sense of it,' and foregrounds the notion of being able to 'make meaning' as either a producer or consumer within that system (Lankshear & Knobel 2003: 15). Education has become focussed on developing a range of literacies, such as scientific literacy, computer literacy, media literacy, and statistical literacy.

Statistical literacy may be defined as

the ability to understand and critically evaluate statistical results that permeate our daily lives – coupled with the ability to appreciate the contributions that statistical thinking can make in public and private, professional and personal decisions (Wallman 1993: 1).

Statistical literacy is directly relevant to the humanities, though it rarely features:

the ability to read and interpret summary statistics in the everyday media: in graphs, tables, statements, surveys and studies. Statistical literacy is needed by data consumers – students in non-quantitative majors: majors with no quantitative requirement such as political science, history, English, primary education, communications, music, art and philosophy. About 40% of all US college students graduating in 2003 had non-quantitative majors (Schield 2010)

One of the problems with introducing statistics into a humanities curriculum is that most students on humanities courses will have limited mathematical skills and/or low confidence in the skills they do possess. Many students may in fact be put off by the fact that film courses have some statistical content because they view it as mathematics. This problem has been widely recognised in the literature on statistical literacy, and although numeracy is a pre-requisite for statistical literacy advocates of statistical literacy stress that it is *not* the same as mathematics. For example, David S. Moore argues that statistical reasoning is one of the liberal arts because it is a flexible and broadly applicable mode of thinking, and prepares students.

Statistics is a general intellectual method that applies wherever data, variation, and chance appear. It is a fundamental method because data, variation, and chance are omnipresent in modern life. It is an independent discipline with its own core ideas rather than, for example, a branch of mathematics (1998: 1254, original emphasis).

From this perspective, the emphasis in early statistical education should be on statistical thinking rather than on statistical methods, prioritizing conceptual understanding rather than computational recipes. Though it may seem contrary to the goals of teaching statistics, a first course in statistics does *not* seek to develop statisticians. Rather it seeks to develop a set of skills and attitudes that allow scholars to be able to engage with the information presented to them. A list of goals for students in developing statistical literacy is provided by Gal and Garfield (1997: 3-5), and includes,

- understanding the principles and processes of scientific discovery,
- understanding the role of statistics in scientific discovery,
- understanding the logic of statistical reasoning,
- understanding statistical terms,
- the ability to interpret results presented in tabular, numerical, and graphical form, and to be aware of possible source of variation and bias,
- the ability to communicate using statistical and probabilistic terminology properly,
- developing a critical stance towards research that purports to be based on data,
- developing the confidence and willingness to engage with quantitative research.

The purpose in obtaining these skills is to become a *statistical thinker* 'able to critique and evaluate results of a problem solved or statistical study' (Ben-Zvi & Garfield 2004: 7).

A similar approach is proposed by Milo Schield who argues that statistical thinking is a form of critical thinking:

statistical literacy, critical thinking about statistics as evidence, is an integral component of a liberal education since a key goal of statistical literacy is helping students understand that statistical associations in observational studies are contextual: their numeric value and meaning depends on what is taken into account. The need to deal with context and confounding is ubiquitous to all observational studies whether in business, the physical sciences (e.g., astrophysics), the social sciences, or the humanities (Schield 2004).

By introducing the topic in this way to students who are already (or should be) familiar with critical thinking should make it easier to encourage them to engage with data-based arguments. It is in this context that we understand the epigram that heads this section. Another perspective is to view statistical literacy as *quantitative rhetoric* (Schmit 2010), which again focuses on 'critical thinking, analysis of argumentation and persuasion, and an ability to interpret statistics in context.'

A direct parallel may be drawn between statistical literacy and media literacy. 'Media literacy' refers to the ability of individuals to access, understand, and create communications in a variety of contexts. It is one of the justifications for film studies and similar fields that it produces media literate citizens. Similarly, courses in statistical literacy aim to produce statistically literate citizens who are able to interpret, evaluate, and use quantitative information when it is presented to them. Since this information often comes to us via the media, statistical literacy and media literacy cannot be separated.

The role of employability in higher education may be defined as 'equipping individuals to secure their own economic success' (Denholm et al. 2003: 12) and covers traditional academic skills, personal development skills, and enterprise or business skills (Purcell & Pitcher 1996). Statistical literacy clearly falls within this definition, and selling such courses to students (who are paying a lot of money) needs to stress this dimension. Presenting statistical literacy within film studies in these terms is a direct response to the observations of the DCMS policy review noted above.

Statistical literacy is different from *statistical competence*, in which individuals function as data producers and analysers in producing original empirical research rather than consumers presented with a completed study. Naturally, we want students to develop the necessary skills that will allow them to produce high quality original research, and it is clear that much research in film studies will require the ability to design studies, collect and manage data, perform statistical analyses, and communicate those results. This depends on statistical literacy – just as you cannot write without being able to read, you cannot become competent in statistical methods without first understanding the role of statistics in empirical research, the ability to communicate ideas in tables, numbers, or graphs, or the willingness to engage with quantitative methods. *Every* film student needs to be statistically literate, but only those who wish to engage in quantitative research requiring the use of statistical methods need to master procedural skills.

However, I do think that *every* film studies post-graduate should receive some training in statsitical research methods.

Statistical literacy resources

There is a very large body of literature in the subject of statistical literacy. Fortunately, there are some excellent resource pages that gather this information and some of these are listed here.

- Statlit.org (http://www.statlit.org/): a good place to start.
- International Statistical Literacy Project (http://www.stat.auckland.ac.nz/~iase/islp/)
- Journal of Statistics Education (http://www.amstat.org/publications/jse/jse_archive.htm#2002): a special issue on statistical reasoning from 2002. The paper by Joan Garfield should be read by anyone interested in statistics in film studies.
- UK Parliament's summary of statistical literacy (http://www.parliament.uk/briefing-papers /SN05708)
- Milo Schield's papers on statistical literacy can be accessed here (http://www.augsburg.edu/ppages /~schield/).

The following papers referred to above can also be accessed freely online (other references are given below):

Gal I 2002 Adults' statistical literacy: meanings, components, responsibilities (http://www.stat.auckland.ac.nz/~iase/publications/isr/02.Gal.pdf), *International Statistical Review* 70 (1): 1-51.

Gal I and Garfield J 1997 Curricular goals and assessment challenges in statistics education (http://www.stat.auckland.ac.nz/~iase/publications/assessbk/chapter01.pdf), in I Gal and JB Garfield (eds.) *The Assessment Challenges in Statistics Education*. Amsterdam: IOS Press: 1-13.

Moore DS 1998 Statistics among the liberal arts (http://www.stat.purdue.edu/~dsmoore/articles /LibArts.pdf), *Journal of the American Statistical Association* 93 (444): 1253-1259.

Schield M 2004 Statistical literacy and liberal education at Augsburg College (http://www.augsburg.edu /statlit/pdf/2004SchieldAACU.pdf), *Peer Review* 6 (4): 16-18.

Schield M 2010 Assessing statistical literacy: take CARE, in P Bidgood, N Hunt, and F Joliffe (eds.) *Statistical Education: An International Perspective*. Chichester: John Wiley & Sons: 133-152. (Excerpts can be accessed here (http://www.statlit.org/pdf/2010SchieldExcerptsAssessingStatisticalLiteracy.pdf)).

Schmit J 2010 Teaching statistical literacy as a quantitative rhetoric course (http://www.statlit.org /pdf/2010SchmitASA.PDF).

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Ben-Zvi D and Garfield J 2004 Statistical literacy, reasoning, and thinking: goals, definitions, and challenges, in D Ben-Zvi and J Garfield (eds.) *The Challenge of Developing Statistical Literacy, Reasoning, and Thinking*. Dordrecht: Kluwer Academic Publishers: 3-15.

Denholm J, McLeod D, Boyes L, and McCormick J 2003 *Higher Education: Higher Ambitions? Graduate Employability in Scotland (http://www.criticalthinking.co.uk/higheredhigheramb.pdf)*. Edinburgh: Scottish Higher Education Funding Council.

Lankshear C and Knobel M 2003 *New Literacies: Changing Knowledge and Classroom Learning*. Buckinghamshire: Open University Press.

Purcell K and Pitcher J 1996 *Great Expectations: The New Diversity of Graduate Skills and Aspirations.* Warwick: Institute for Employment Research.

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About Nick Redfern

I graduated from the University of Kent in 1998 with a degree in Film Studies and History, and was awarded an MA by the same institution in 2002. I received my Ph.D. from Manchester Metropolitan University in 2006 for a thesis title 'Regionalism and the Cinema in the United Kingdom, 1992 to 2002.' I have taught at Manchester Metropolitan University and the University of Central Lancashire. My research interests include regional film cultures and industries in the United Kingdom; cognition and communication in the cinema; anxiety in contemporary Hollywood cinema; cinemetrics; and film style and film form. My work has been published in Entertext, the International Journal of Regional and Local Studies, the New Review of Film and Television Studies, Cyfrwng: Media Wales Journal, and the Journal of British Cinema and Television.

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